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A WELCOME

WE write this note as we go to press on the eve of one of the most eventful weeks which the Institution of Gas Engineers has organised. We say this advisedly because, in fact, Institution Week, which normally coincides with such a minor event as the Derby Stakes, has by courtesy and forethought been subjugated to the first meeting of the International Gas Union to be held in Great Britain.

We applaud the gesture and we hope that the 750 delegates from all parts of the world who will attend the opening session today will, after the meeting, feel that their efforts have been rewarded not merely in the technical sense but in the knowledge that human happiness can be provided within our shores.

We extend to overseas colleagues a warm welcome, and they will forgive us if we mention that the international conference starting today is largely the result of initiative on the part of the Institution of Gas Engineers. The Zürich conference in 1934 and that in Paris in 1937 remain in the vivid memory of many of our readers. We hope that the conference of 1949 will create a lasting impression of the desire of this country not only to give what it can technically within its sphere, but more widely to co-ordinate in a practical way, through international ethics, the activities of other countries working in similar fields.

If, in Institution Week, we think for the moment especially of the conference of the International Gas Union, we do so in the conviction that Mr. Edward Crowther shares our thoughts. The one-and-a-half days' meeting of the Institution is over. It lost nothing either in substance or fervour by its brief span ; it gained for the Institution much in prestige in that those who planned the week's proceedings saw things as a whole and were biased by neither politics nor partisanship.

A week today our Institution Number will be off the press and will prove worthy of a memorable Institution Meeting, which is the high-light of our gas industry's calendar.

In extending this welcome to our overseas friends we would add that our words will be followed by a very special 'I.G.U.' issue of the *Gas Journal* on July 6. Feigning neither pride nor modesty we claim that this 'special' will not fail to please those who wish for something other than the ephemeral shimmer. We approached fairly and squarely the tough problem of dealing with the papers presented by overseas bodies, of which many were in French. As the result, we have achieved the highly desirable solution of subjecting every one of the contributions to exclusive and scholarly study, with the essential background of technical knowledge and an understanding of French literature.

We hope that our efforts will meet with the approval of the many overseas delegates who are adding to the lustre of the present conference and of those of our own country who will find within the pages of our issue of July 6 a technical epitome of current world thought as it affects the gas industry.

GAS QUALITY

ONE of Mr. S. L. Wright's first tasks after taking up his post as Gas Engineer to the Wales Gas Board was to deputise at short notice for a fellow member who had found it impossible to present a promised paper to the Wales and Monmouthshire Association of Gas Engineers and Managers. Time taken in preparation does not bear any fixed ratio to the quality of the ultimate paper, and in this instance Mr. Wright's hurriedly collected thoughts were most effective in provoking discussion on a problem which must always be given high priority among gas engineers. The paper, which we publish in this issue, was primarily concerned with calorific values which, in Wales, range from 400 to 510 B.Th.U., with the greatest number, though not a clear majority, in the 440-460 range. Calorific value is only one factor in gas quality, and Mr. Wright laid stress on the desirability of each undertaking examining its practice to ensure that irrespective of the declared calorific value it has in force, the gas supplied ensures also flexibility in distribution according to the capacity of mains, and flexibility in the use of the appliances through which it serves the consumer. He added that price of gas to the consumer must be an over-riding consideration.

The Gas (Quality) Regulations, 1949, lay the onus on area Boards for maintaining the calorific value of the gas supplied at not less than the declared figure, and impose penalties for cases where the quarterly average for any period of two hours is continuously more than 5% below the declared calorific value. We do not know to what extent existing declarations are likely to be varied. The fact that adequate instrumentation has been a 'luxury' beyond the means of the smallest undertakings, combined with the difficulty of obtaining coals of uniform quality over an extended period, has prevented anything in the way of standardisation. One result of nationalisation may be that increased attention will be given to the provision of instruments in the smaller as well as the larger works. As the Heyworth Report pointed out four years ago, there would be substantial advantages in a measure of standardisation of gas quality—regarding which calorific value plays a minor rôle—in each area in that it would facilitate the transfer of gas in bulk from one district to another. But four years have passed since the Heyworth Report, which at best was based on inadequate data. The prognostications of the Heyworth Committee have in the event proved wrong, and undue adherence to its findings will hamper gas industry progress. The major problem today is to meet a public demand for gas which the Heyworth Committee did not envisage and which will never be met by concentration on calorific value. To cope with peak loads

we shall have to mix gases without muddling performance at the consumer's burners, and we shall have to balance the heat ratio in solid and gaseous form during the winter months.

AREA COMPETITIONS?

THE Department of Labour and Industry of New South Wales has for several years been very busy on Intelligence Quotient. Irrespective of war and its aftermath the Department has held many examinations in order to prove whether the candidate is (*a*) an idiot, (*b*) an imbecile, (*c*) a moron. The intelligence quotient is based on an average, taking age into account. Thus, if a boy aged 15 has the intelligence of an average man of 20, he is, for his age, very intelligent indeed. If the average for a man of 20 is taken as 100, then this particularly precocious youth has an intelligence quotient of 133. Over the years, and despite the yellow peril, the Department of Labour and Industry of New South Wales, flogging examinations with undiminished vigour, a few months ago came to the conclusion that there existed in New South Wales a few very dull people, a very few clever people, and the majority of average intelligence. From the statistics published many a moron roams around the Commonwealth. This study, in which the Sydney Technical College was immensely interested, is of importance in reflecting intellectual trends of today. Equally important, no doubt, was the fact that on May 31 the Court of Cassation in Paris quashed the conviction of the poet Charles Baudelaire, who was fined in 1857 for an offence against public morals in publishing *Les Fleurs du Mal*, six poems from which were ordered to be suppressed. Under a law passed in 1946 revision of such convictions is now possible in certain circumstances.

We come to the tentative conclusion that we live in a state of flux and that it is, perhaps, unfair to libel Mr. A. or Master B. with labels connoting that he is either genius or just dotty. At the same time we should be the last to decry the efforts being made in Australia to sieve the community into standardised groups. The matter is, in truth, serious enough. In New South Wales 10% of the population are above an intelligent quotient of 120. No doubt the Greeks had another interpretation of this result, but the fact remains that the electricity industry of Australia is getting a greater share of that 10% of super-men than is the gas industry. And the answer to this involves, (*a*) attractive salaries and conditions of employment, (*b*) opportunities for training, and (*c*) an assured line of promotion. There are now 12 area Boards running the British gas industry. Following the lead of Australia, would it be a good idea if the West Midlands Board, for example, had an intelligence quotient competition with the East Midlands Board for those who, in a nationalised industry, are to keep the gas flag flying instead of flagging?

HOME SERVICE EXTENDED

It would appear that the remarkable progress made by the Home Service Section of the British Gas Council since its inauguration in 1934 is likely to continue at least as effectively under the umbrella of the Gas Council. Certainly its first major undertaking since nationalisation—a two-day conference held on June 2-3—went with a decided swing, although naturally the bulk of its planning took place before the change-over. It was, of course an enlarged and improved version of the meeting held a year ago, which may be said to have given home-service a new status in the social and educational functions of the gas industry. It was attended by 140 Home Service advisers, representing 80 undertakings, and this charming assembly of business-like ladies indulged in something like 13 hours of talking 'shop,' pursuing their particular problems and interests like a pack in full cry. The success of the function was, we suggest, due to four factors: (i) the managers of the undertakings represented were sufficiently appreciative of the advantages of such a gathering to permit their Home Service staff to attend; (ii) the essential keenness of the Home Service advisers and their interest in their work; (iii) the admirable programme, the subjects of which were selected by the delegates themselves; and (iv) the organising ability and genial chairmanship of Mrs. Eileen Murphy.

A WIDE FIELD OF INTEREST

The programme embraced almost every aspect of home service most likely to assist those present: Dr. H. E. Magee, Senior Medical Officer of Health to the Ministry of Health, discussed nutrition; Mr. John Munro Fraser, Controller of Membership Services of the National Institute of Industrial Psychology, spoke pithily of the art of interviewing; Miss Joan Langley, of Bristol, described co-operation with marriage and family guidance councils; Miss Mary Strong, of Newcastle-upon-Tyne, spoke of the contacts made possible by mobile demonstration units (described in the *Journal* of June 1); Miss E. M. Whitton, London (Central Division), shed light on the groundwork for future sales; and Miss A. E. R. Ashton told how the interest of neighbouring communities was stimulated in and around Stretford. That highly concentrated programme occupied the Thursday afternoon session. We were privileged to attend the private discussion on subjects relevant to home service which took place the following morning, and to hear Miss Joyce Rutherford, of the Good Housekeeping Institute, speak of development in laundry work. In the afternoon Mrs. Una Cooling offered words of wisdom on the ticklish subject of judging at produce shows and similar functions. The delegates stayed the course admirably and at the end of the session seemed ready, given the opportunity, to continue discussions throughout the week-end. Perhaps they were encouraged by Mr. Sylvester's words at the lunch on June 3. 'This is an age,' he said, 'of mechanisation, standardisation, and mass production, in which utility is preferred to beauty and quantity to quality. You are fortunate because the accent of your work is on beauty and quality, and you are developing one fine art—cooking—which will in itself bring you much happiness because you will be taking part in something of rather more than a day-to-day nature.' There has in the past been insufficient contact between Home Service staffs and too little co-ordination of methods and policies. By means of such conferences as this and the several discussion groups in various parts of the country this state is being remedied, and this cannot but produce a higher standard of home service and consequently a strengthening of the gas industry's long-established contact with its consumers.

Personal

Sir WALTER BENTON JONES, BART., has been appointed Chairman and Mr. LESLIE O'CONNOR Vice-Chairman of the British Association of Coke Oven Tar Producers.

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Mr. C. S. SHAPLEY, O.B.E., formerly Engineer and General Manager of Leeds Gas Department, has joined the Board of Directors of William Edgar and Son, Ltd.

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Mr. L. H. HARDERN, B.A., formerly Public Relations Officer of the Gas Light and Coke Company, has been appointed Public Relations Officer of the North Thames Gas Board.

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Prior to taking up the position of Deputy Divisional Controller, Glasgow Division of the Scottish Gas Board, Mr. E. G. SMITH, Engineer and Manager, Dunfermline, was presented with an electric clock by Mr. J. H. Kinnon, Assistant Engineer and Manager, on behalf of the employees of the Scottish Gas Board, Dunfermline District.

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Mr. JOHN SMART, Engineer and Manager of Monifieth gas undertaking, who has severed his appointment with the town council, was presented with a fishing rod and reel by town council, officials and staff, last week, in recognition of his 29 years' service. Provost J. G. Taylor handed over the gift.

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Employees of the Tunbridge Wells undertaking made a presentation on June 3 to Mr. J. W. TOWNSEND, formerly Engineer and General Manager of the Tunbridge Wells Gas Company, on his appointment as Engineer of the Kent County Division of the South Eastern Gas Board. Mr. G. J. B. Cox, Acting Manager at Tunbridge Wells, in making the presentation of a wrist watch, said that during the six years that Mr. Townsend was General Manager everyone placed a high value on his ability and enthusiasm, and the consideration he showed to all. During the difficult war and immediate post-war years, when the staff was small and the plant inadequate, the company under his leadership never failed the consumer. When the war ended reconstruction and reorganisation were begun, the success of which was a tribute to Mr. Townsend.

Mr. A. HITTINGER relinquished his position as Managing Director of the National Benzole Company, Ltd., on May 31. By the unanimous decision of his fellow Directors, however, he will continue as Chairman of the Board of Directors. Mr. R. J. SMITH, Director and General Manager, will now be the Senior Officer of the Company.

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Staff and employees of the Scottish Gas Board (Fife group, Kirkcaldy district), honoured Mr. GEORGE BROWN, Chief Clerk of the former Kirkcaldy Gas Department, on the occasion of his retirement. Mr. David L. Dickson, Manager of the Fife group, made the presentation of a gold wristlet watch, and referred to the fact that Mr. Brown had served the undertaking under three régimes—Kirkcaldy Gas Light Company, Kirkcaldy Corporation, and the Scottish Gas Board over a total of almost 50 years.

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The accompanying photograph is of Mr. F. C. Wilson, a Director of George Wilson Gas Meters, Ltd., whose record of over 30 years' service as Secretary of the company's National Savings Group has fully earned the recognition of a personal medal and also on behalf of the firm, a plaque, which is also shown in the photograph. 'Uncle Fred,' as he is known in the industry, started the Group at the works in June, 1916, and since that date has continued to act as its Secretary without interruption. In later years he received assistance, particularly from Miss L. M. Johnson and Miss E. Rudd, and in both cases recognition of this fact has been accorded by the National Savings Movement, Coventry Industrial Savings Committee.

King's Birthday Honours

A number of names well known in the gas industry appeared in the King's Birthday Honours List published on June 9. The most interesting, in view of his position in the industry, was the conferment of the distinction of Ordinary Knight Commander of the Civil Division of the Most Excellent Order of the British Empire (K.B.E.) on Mr. A. E. SYLVESTER, F.C.A., Chairman of the Gas Council. The list included the following :—

Knighthoods :

Mr. JOHN CHARRINGTON, Chairman of Charrington, Gardner, Locket and Co., Ltd., and Chairman, since its formation, of the Distributors' Branch of the London and Counties Coke Association.

Mr. WILLIAM JONES, C.B.E., part-time member of the Wales Gas Board, formerly Clerk of the Denbighshire County Council, member of the Royal Commission on Capital Punishment, for public services in North Wales.

Knights Commanders of the Order of the British Empire (K.B.E.):

Mr. ARTHUR EDGAR SYLVESTER, F.C.A., Chairman of the Gas Council, formerly Governor of the Gas Light and Coke Company.

Mr. GEORGE L. WATKINSON, C.B., M.C., Deputy Secretary, Ministry of Fuel and Power.

Commander of the Order of the British Empire (C.B.E.) :

Mr. GEORGE LE BOUTILLIER DIAMOND, M.I.MECH.E., Chairman of the West Midlands Gas Board, lately Regional Controller, South Eastern Region, Ministry of Fuel and Power.

Officers of the Order of the British Empire (O.B.E.) :

Mr. HUGH P. HADDOW, M.C., Chief Information Officer, Ministry of Fuel and Power.

Mr. WILLIAM J. SANDEMAN, J.P., Director of the former Croydon Gas Company, Chairman of the Croydon Savings Committee.

Mr. CHARLES S. SHAPLEY, M.I.MECH.E., lately Engineer and General Manager, City of Leeds Gas Department.

Mr. KENNETH H. WILSON, Chairman of Albright and Wilson, Ltd., Chairman of the Oldbury Local Employment Committee.

Members of the Order of the British Empire (M.B.E.) :

Mr. FRANCIS C. BRIGGS, M.I.C.E., M.I.MECH.E., for services as Deputy Chairman and Managing Director of the Dudley, Brierley Hill, and District Gas Company.

Mr. DAVID MORTON, Regional Gas Officer, Northern Region, Ministry of Fuel and Power.

Mr. L. F. King

Mr. L. F. KING, formerly Southern District Sales Manager of Fletcher, Russell, and Co., Ltd. (Radiation Ltd.) has been appointed Southern Sales Manager over an area which includes London. He will operate from the London Office at 7 and 8, Stratford Place, W.1 (MAYfair 6462).

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Mr. FREDERICK GIBSON who is a native of Newbiggin (Northumberland) and who has been appointed Deputy Chief Accountant with the Northern Gas Board began his early training with the Newbiggin Gas Company and afterwards joined the Lowestoft Gas Company. Three years ago he became Assistant Secretary to the East Hull Gas Company and last year was promoted to the Secretaryship.

Obituary

Mr. J. S. BROWNE, who was for many years Representative of the Vulcan Stove Co., Ltd., Exeter, in the South of England, died in a nursing home at Brighton on June 8. Mr. Browne had been ill since November.

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The death has occurred at Darlington of Alderman J. D. HINKS, a well-known local public man and Chairman for a number of years of the Corporation Gas, Electricity, and Water Committee. He was 75 years old and had been a member of the local Council for 26 years.

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The death occurred suddenly on May 30 of Mr. A. WELLS, Engineer and Manager of the Herne Bay undertaking of the South Eastern Gas Board. He was appointed Works Manager of the Herne Bay Gas Company in 1924, became Assistant Engineer and Manager in 1936, and in 1941 was appointed Engineer and Manager in succession to Mr. F. Dawson.

Diary

June 15-20.—**International Gas Union:** Fourth International Gas Conference, Institution of Civil Engineers, Great George Street, London, S.W. 1. (For full programme see *Journal* of April 6, p. 45.)

June 18.—**Scottish Junior Gas Association (Eastern District) :** Annual Outing.

June 22.—**Manchester District Junior Association of Gas Engineers :** Ladies' Day. Visit to Southport works.

June 23.—**Gas Council, Coke Department :** Technical Coke Committee, Gas Industry House, 2.30 p.m.

June 24.—**Northern Junior Gas Association :** Annual General Meeting, Seaburn Hotel, Sunderland.

June 24.—**Waverley Association of Gas Managers:** Annual Meeting, Y.M.C.A. Hall, Edinburgh, 10.15 a.m.

June 25.—**Wales Junior Gas Association :** Summer Meeting.

June 25.—**Western Junior Gas Association :** Summer Meeting and Ladies' Day, Exeter. Inspection of Exeter Gasworks, 11 a.m. ; luncheon, Rougemont Hotel, 12.45 p.m. ; motor coach tour, 2 p.m.

June 30.—**Gas Council, Coke Department :** Coke Committee, Gas Industry House, 11 a.m.

June 28.—**Southern Association of Gas Engineers and Managers:** Summer Meeting, Taunton.

July 1.—**Manchester District Association of Gas Engineers:** President's Day, Blackburn.

July 13.—**National Benzole Association :** Annual Meeting, 3.45 p.m. Wellington House, Buckingham Gate, S.W.1.

The Institution of Gas Engineers has published three new grey editions—*Gas Production in Perspective*, by T. Campbell Finlayson, M.SC., M.INST.GAS E., M.I.CHEM.E. (Technical Director), and Frank S. Townsend (Senior Assistant, Design Department), of the Woodall-Duckham Company; *The Development of the Gas Industry in the Netherlands*, by G. A. Brender à Brandis, Professor at the University of Delft; and *Purification and By-Product Recovery: A Review*, by C. Cooper, M.SC., M.INST.GAS E. (Director and Head of Technical Department), and D. M. Henshaw, M.INST.GAS E. (Chairman and Joint Managing Director), of W. C. Holmes and Co., Ltd. They are numbered 334/138, 333/147, and 335/149 respectively. Copies are available from the Secretary, 1, Grosvenor Place, S.W.1, price 2s. 6d. post free.

STEPS TOWARDS CLEANER COAL

Indication of the steps which the National Coal Board were taking to improve the quality of house coal was given by Sir Arthur Street, Deputy Chairman of the National Coal Board, in a speech at the annual luncheon of the Coal Merchants' Federation of Great Britain, in London, on May 25.

Sir Arthur said that coal from thinner seams and increased mechanisation—and increased production, too—had combined to increase the amount of dirt in the coal and the amount of coal in need of cleaning. In 1947 three new cleaning plants were brought into operation capable of handling 400,000 tons a year. In 1948, 23 more plants started work with a capacity of about 5½ mill. tons. To speed up the construction programme a washery of standard design was introduced which could be completed in half the time and more cheaply than a 'tailor-made washery.'

So that all washeries were used to capacity more coal was being transported from collieries with inefficient cleaning plant or none to nearby pits with spare capacity, although this operation involved the Board in heavy expense. In Yorkshire alone 400,000 tons were moved in this way in 1948 as against 100,000 tons in 1947. As a result of these and other measures, large coal, graded coal, and cleaned smalls which in 1947 amounted to 62% of total output, came in 1948 to 66.7% of total output. Untreated smalls which accounted for 16.3% of output in 1947 had in 1948 dropped to 14.8% of output.

In spite of supply difficulties, they had recently restored to some extent normal commercial relationships between buyer and seller in the house coal market. Within the field of their allocations to depôts, they had been able to give them some freedom to express their preferences for particular types and qualities of coal.

COKE SALES CIRCLE

The third meeting of the London and Counties Coke Sales Circle was held at Gas Industry House on May 26, and was attended by 150 members.

The meeting was opened under the chairmanship of Mr. F. S. Evans (Coke Manager, South Eastern Gas Board). Before proceeding with the business, the Chairman said that it was with regret that he had to inform the members that their Secretary, Mr. F. S. Haddock, was in hospital. The meeting agreed that a letter expressing their hope of a speedy recovery should be sent to Mr. Haddock, and approved the appointment of Mr. Meyrick as Deputy Secretary. Mr. Meyrick then presented a brief report on the Circle's activities to date, which showed a total membership of 276, comprising 123 producers and 153 distributors.

The Chairman then introduced Mr. A. W. Pratt of the Building Research Station of the Department of Scientific and Industrial Research, who gave a lecture on the trials of house heating systems, carried out in 20 semi-detached houses at Abbots Langley, Hertfordshire. Mr. Pratt explained that the trials, held in specially built, insulated houses, were first carried out by technical staff performing the normal daily routine of a household so far as heating services were concerned, and after six months by instruments with the houses occupied. The houses, he said, were all run to the same thermal routine arrived at after consultation with the Ministry of Works.

The meeting was shown a film, 'Heating Research in Houses,' produced by the Central Office of Information for the D.S.I.R., illustrating how Mr. Richard Eve and Dr. D. J. Weston, the architect and scientist in charge of the experiments, and their assistants carried out the tests, which included the measurement of temperature changes, heat losses, intensity of radiant heat, external climate, and wind velocity. The houses were then redecorated after six months, and selected tenants from the local Council's housing list moved in. At this stage instruments replaced the technicians who had previously done the measuring.

The film over, Mr. Pratt gave a short address, illustrated by lantern slides, which provided data on the relative economic merits of the different appliances in use. He said that the 19 heating systems in the houses were divided into three groups. The first group, the 'partial system,' used only open grate fires and the usual cooking appliances. The second group, the 'two-stage system,' used convected air heating, supplying hot water through the radiators, and 'topped-up' with gas or electric heaters. The third, the 'whole-house system,' provided a constant temperature 30° above the outside temperature. An analysis of the costs involved, based on a Ministry of Health loan to local authorities at 2½% over 60 years, showed that 'whole-house' heating and 'partial' heating were equally economical, although 'whole-house' heating provided a higher average mean temperature, but that 'two-stage' heating was far more expensive. It was, however, pointed out that in the 'two-stage' group, with one exception, hot water was supplied by separate appliances, and that savings would result from a use of a closeable fire with a back-boiler.

After a brief discussion, Mr. D. O. Rose moved a vote of thanks to Mr. Pratt for a most interesting and instructive talk.

PRESENTATION TO EXAMINERS

Mr. D. V. O'Meara, General Manager of the Croydon Gas Company, was host at a luncheon at Croydon to mark the final meeting before vesting date of the Panel of Examiners for the London District Gasfitters' Classification Scheme. Interest was added to the occasion by the fact that the first meeting of the Panel was held at Croydon, and that the London District Gasfitters' Classification Scheme, being the pioneer scheme, has set the standard on which other regional schemes have been modelled.

Presentations were made to Mr. C. H. Rendell, Secretary to the Committee since the inception of the scheme, and to Messrs. G. A. Hill (Croydon) and I. T. Herriott (Wandsworth), both of whom were appointed as examiners by their respective undertakings at the commencement of the scheme in 1932. The presentations were made by Mr. J. W. Hunter (North Middlesex), Chairman of the Examiners, who paid tribute to the work of each of the three recipients throughout the 17 years which had elapsed since the introduction of the scheme, and who were now about to take their leisure in well earned retirement.

In his reply to a vote of thanks proposed by Mr. C. H. Rendell, Mr. O'Meara referred to the advantages which the scheme had conferred, not only on the successful candidates who qualified for improved rates of pay, but also by effecting a great improvement in the standard of craftsmanship of gasfitters generally, which improvement had, in turn, benefited the undertakings concerned and the public whom they served.

PROGRESS IN FIRE RESEARCH

The first annual report of the D.S.I.R. and Fire Offices' Committee Joint Fire Research Organisation, containing the reports of the Fire Research Board and the Director of Fire Research for 1947 has been published by H.M. Stationery Office (1s. 3d., by post 1s. 5d.). The Joint Fire Research Organisation was established in 1946 to carry out research on the prevention and extinction of fires, on the safety of life in fires, and on the mitigation of damage. It represents a new venture on the part of the Government in that the running costs are shared equally by the D.S.I.R. and Fire Offices' Committee, who have also contributed their testing station at Elstree towards the capital cost.

Through the co-operation of the Home Office and the Fire Service the Joint Fire Research Organisation receives a report of every incident attended by the fire brigades. The reports, which amount to about 75,000 each year and are made on a special form, are analysed by means of a punched card system to provide information to indicate what aspects of fire damage need research and investigation. In addition, the Fire Service prepares detailed technical reports on fires of special interest. Officers of the organisation have obtained first hand information on fires actually in progress by attending them with fire brigades.

The organisation carries out tests with furnaces on building units, such as walls and partitions, columns and piers, beams, floors and roofs, ceilings, doors and shutters, &c. At present all these tests have to be done on full scale units. Further work is aimed at producing a satisfactory method of scaling down these tests to save time and money. A building was erected for experiment on the protection of steelwork by drencher systems. A petrol fire which could be varied in size was used to determine the largest fire against which steelwork could be protected by preventing the temperature from exceeding 265° C. Above this temperature steel begins to weaken.

Work was started on the use of water sprays in fire extinction. A survey of the performance of various types of nozzles and impinging jets has begun. Studies were also made of the use of foam and extinguishing agents such as carbon tetrachloride in dealing with petrol and oil fires. Work has also been done on the operation of sprinklers and fire alarms in large buildings. One of the worst problems which firefighters have to face is that of smoke. Water sprays are one of the means of coping with the problem by washing down the smoke, and the laboratory work was concerned with these sprays because the fireman is familiar with water and it is practically always available. The effect of quantity of spray, droplet size and the addition of wetting agents on the increase of light transmission through a standard smoke was investigated. The finer sprays gave the best results. Wetting agents produced a slight improvement but this was too small to be of practical value.

The Coal Tar Research Association have now moved their offices to the new research station at Oxford Road, Gomersal, near Leeds. The temporary telephone number is Cleckheaton 851.

George Wilson Gas Meters, Ltd., were among 13 Jarrow firms who subscribed to present a silver and ebony mace to the retiring Mayor of Jarrow (Councillor P. Scullion) to mark the industrial revival of Jarrow, which in the early 1930's was regarded as the North's black spot. The mace was handed over by Mr. J. G. Hunter Brown, of Palmers Co., Ltd.

CALORIFIC VALUE CONSIDERATIONS*

By S. L. WRIGHT, Gas Engineer,
Wales Gas Board

DECLARED calorific values throughout Wales range from 400 B.Th.U. to 500 B.Th.U. with the following numbers of undertakings in the various calorific value ranges.

425	B.Th.U.	(400-435)	24 Undertakings.
450	,,	(440-460)	35 ,,
475	,,	(465-485)	7 ,,
500	,,	(490-510)	16 ,,

In determining declared calorific values, consideration will have been given to the availability of coke oven gas and to its calorific value, to the type of gas making plant employed, the characteristics of the coal carbonised, and to the market value of coke.

Leaving out of consideration those undertakings which receive supplies of coke oven gas or town gas in bulk, the undertakings in Wales can be further sub-divided in the various calorific value ranges as follows:—

B.Th.U. range	Undertakings using vertical retorts with or eithout steaming: Using South Wales coals	Using other coals	Total	Undertakings using horizontal retorts with or without producer gas: Using South Wales coals	Using other coals	Total	Undertakings supplying coal gas and water gas
425	2	1	3	5	7	12	3
450	5	5	10	5	14	19	6
475	—	—	—	1	6	7	—
500	1	—	1	2	7	9	—

Onus on Area Boards

The Gas (Quality) Regulations, 1949, lay the onus upon Area Boards (where charges for gas are made according to the number of therms supplied) for maintaining the calorific value of the gas supplied at not less than the declared calorific value, and impose penalties for cases where the quarterly average is below the declared calorific value or where the calorific value for any period of two hours is continuously more than 5% below the declared calorific value. The Gas Regulation Act, 1920, allowed freedom of choice of calorific value to gas undertakings and it can be assumed that declared calorific values were chosen to suit local plant and conditions.

The different calorific values that have been chosen where other conditions are the same appear to justify each undertaking examining its practice to ensure that the declared calorific value now in force does indeed enable the following requirements to be met:—(1) Calorific value and specific gravity to be controllable within close limits; (2) combustion characteristics to be constant and satisfactory for existing appliances and processes; (3) the gas quality to be suited to the carrying capacity of the existing district mains; (4) the lowest possible cost to be incurred per therm delivered to consumer.

Quality Control

Whatever methods of control are used they must be convenient to operate and some clear indication of their effect must be provided. Not all works have been able to afford the luxury of a calorific value recorder on the make gas as well as on the town gas and where it is possible to arrange for daily spot tests to be taken on a water flow calorimeter it has been found to be advantageous to have a record of the calorific value of the make gas rather than of the town gas.

The principle of setting certain limits within which the calorific value of the make gas must be kept and making the man in control responsible for letting someone higher up know if he is unable to maintain the gas within these limits is one that can be applied on the small as well as on the larger works and it has been found to create interest and attention without imposing unfair responsibility.

The principles of control vary so much between continuous vertical and horizontal retorts that these two systems will be referred to separately.

Continuous Vertical Retorts

The production of gas of constant quality from continuous vertical retorts is more or less automatic provided that the following variables are under control: (i) Class of coal carbonised; (ii) extractor speed; (iii) combustion chamber temperatures; (iv) rate of steaming; (v) pressure conditions in the retorts.

Coal.

A study of the behaviour of each class of coal allocated and anticipation of that behaviour by altering the drives or varying the rate of steaming is necessary to ensure constant gas quality. Coals may be carbonised as an approximate blend or as individual parcels according to the number of different coals and the quantities delivered at a time.

The emptying of retort house coal bunkers over the week-end can cause variations in retort performance at a time when technical supervision is at a minimum. This variation can be reduced by arranging for surplus coal to be left at the foot of the coal elevator for subsequent elevation on the Sunday morning, but this procedure naturally depends on the coal handling arrangements at individual works.

It is assumed that the services of the Coal Spokesman have been secured to ensure that no markedly unsuitable coals are supplied to continuous vertical retort installations.

Extractor Speed.

The conversion of extractors to electric motor drive has, in the writer's experience, led to such reduction of variation in coal travel that it would seem that the steam driven extractor engine and the steam supply to that engine should be closely checked for possible variations in performance. Stokers should be encouraged to take hourly readings of a rev. counter on the extractor engine as a warning to them of any alterations in plant conditions.

Combustion Chamber Temperatures.

Regularity in clinkering the fires, filling the producers and in cleaning flues should be established. The use of sensitive draught recorders on the main C.O. flue and on the main waste gas flue is strongly recommended as a means of disclosing reasons for temperature variations and obviating recourse being had to individual retort dampers.

Rate of Steaming.

Regular inspection of steam nozzles and control of steam by a pressure reducing governor rather than by a stop valve are desirable.

Pressure Conditions in the Retorts.

Points to be watched are the performance of exhauster and retort house governors and the regular rodding of the retorts and the provision of a sensitive vacuum recorder at the inlet of retort house governor is to be recommended.

Horizontal Retorts

The control of gas quality from a horizontal retort bench is complicated by the intermittent nature of the charging operations and a swing of 50 B.Th.U. either side of the average value is by no means an indication of bad practice. Recognised means of damping these variations and of controlling the average calorific value are:—

(i) Retort charging at regular and frequent intervals.
(ii) The use of two holders, one for make gas and one for town gas.
(iii) Dilution of straight coal gas by producer gas and washed waste gases.

Retort Charging Timetable.

The essential feature is that retorts should be charged at regular intervals as frequently as possible, taking into account other retort house duties and breaks required for refreshment and change of shift.

The Use of Two Holders.

Where two holders are available consideration should be given to passing the make gas into one holder whence it is fed at necessary intervals into the other holder which is retained for supplying the town. The simplest arrangement is where the make holder throws more pressure than the town holder. The plant is worked with the inlet of the make holder and the outlet of the town holder always open. The opening of the inlet valve of the town holder when the make holder is full, then fills the town holder with gas which has already been mixed in the make holder. Other cases may call for using the holders alternately for town and make gas or for boosting the gas from a lighter holder into a heavier one. In all cases automatic valves and/or holder alarms are desirable.

Dilution of Straight Coal Gas.

The production of gas with the lowest possible inert content should be the aim in all retort houses. There can be no question that dilution of straight coal gas by drawing in waste gases through the retort walls or by drawing in air through leaking

* Paper presented at the 44th Annual Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers, May 19, 1949.

mouthpieces and ascension pipes is a practice to be strenuously avoided.

On the other hand a low inert content is only achieved by maintenance of the retort setting in good repair, by careful attention to retort charging and scurfing timetables and close control of vacuum conditions, all of which in themselves promote maximum thermal yield per ton of coal.

The practice of putting retorts under pressure to reveal leaks in mouthpieces and pipe joints is essential if a rich coal gas is to be made and the inspection and patching of retorts each time before they are charged should be a matter of routine, promoted by the necessary patching tools and material being readily available.

The adoption of a regular scurfing cycle whereby retorts are scurfed after not more than two weeks at work, has the advantage of promoting retort tightness due to the lesser time that the retort is exposed to the air and of enabling larger charges to be carbonised.

Unevenly sealed dip pipes can be corrected by working with them unsealed as in vertical retort practice, but retort tightness and close vacuum control are first essentials and this procedure is not recommended unless retorts are in good condition and a relay type of retort house governor is installed.

The summer resetting of retort beds creates an opportunity for improving the quality of gas made in the retort house and those undertakings with dilution producers already installed may find it possible to secure still better results by attention to the above principles.

Quality Obtainable

The following tables, derived from figures published in the Final Report of the Gas Research Board on the Combustion Characteristics of Town Gas (Communication No. G.R.B.34, October, 1947), indicate the quality of gas obtainable from horizontal retort settings when coal of normal volatile and ash content is carbonised.

Calculated Calorific Value and Specific Gravity Tables.
Assumed Basic Properties.

	Cal. Val.	Spec. Grav.
Straight Coal Gas containing 5% air ...	570	0.46
Producer Gas	120	0.90
Waste Gas	Nil	1.08

Dilution of Straight Coal Gas with Producer Gas.

Mixture % Coal Gas	% Producer Gas	Calorific Value	Specific Gravity
100	—	570	0.460
95	5	547.5	0.482
90	10	525	0.504
85	15	502.5	0.526
80	20	480	0.548
75	25	457.5	0.570

Dilution of Straight Coal Gas with Waste Gas.

Mixture % Coal Gas	% Waste Gas	Calorific Value	Specific Gravity
100	—	570	0.460
97.5	2.5	556	0.475
95.0	5.0	542	0.491
92.5	7.5	527	0.506
90.0	10.0	513	0.522
87.5	12.5	499	0.537
85.0	15.0	485	0.553
82.5	17.5	470	0.568

If undertakings are to be enabled to maintain their declared calorific value without difficulty, it seems that the admission of a certain amount of diluent gas at all stages in the cycle of production of a rich straight coal gas should be allowed for when decision is made as to the calorific value to be declared. Such diluent gas may be washed waste gases, producer gas, water gas from steaming the coke charge in the retort or from a separate water gas plant.

The advantage of a calorific value chosen with this principle in mind is that it gives a margin for quality control without having recourse to the retort house governor except for the maintenance of constant pressure conditions in the retorts.

Combustion Characteristics

In the Final Report of the Gas Research Board on the Combustion Characteristics of Town Gas, already referred to, it is stated that:—

(i) The control of calorific value alone, no matter how exact, is of itself insufficient to ensure uniformity of combustion characteristics.

(ii) The various diluents used have different effects upon the properties of the resultant mixture, and it is therefore important at any one works to adopt a uniform scheme for attaining the declared calorific value.

The elimination of diluents altogether, apart from air for purification and those inert gases which are inherent in the coal, resulting in the distribution of a town gas having a calorific value in the region of 550 B.Th.U., should ensure uniformity of combustion characteristics, but it has to be recognised that a very low specific gravity combined with a high calorific value may with certain appliances make it difficult to obtain sufficient primary air injection. This same combination of low gravity and high value will also give a large flame with rat tail or flat flame burners necessitating the use of small orifices where combustion in a confined space is concerned.

It is evident from the wide range of calorific values in use throughout the country that satisfactory combustion characteristics do not necessarily depend upon the choice of any particular calorific value, but upon that choice allowing a uniform scheme to be adopted for maintaining that value.

The combination of high calorific value with low specific gravity has recognised advantages in increasing the thermal carrying capacity of gas mains and services and it also has the effect of increasing the effective storage of gasholders and of reducing back pressure troubles in purifiers.

The distribution system should be large enough to ensure that all consumers get an adequate supply of gas without reliance having to be placed on a low specific gravity to enhance the carrying capacity of the mains, but district needs should be taken into account when declaration of calorific value is considered.

Cost per Therm

The financial considerations underlying the selection of the declared calorific value have been dealt with by Mr. J. E. Davis in his paper to the Institution of Gas Engineers in 1943 (*Gas Journal*, 1943, 242, 46), and it is not proposed to refer to them in detail. The relative costs of coal, coke, gas oil, and wages may, however, have changed very considerably since the present declared calorific value was selected, and it is suggested that the present choice of calorific value should be reviewed in the light of prices ruling at present in conjunction with the application of the principles of control that have been outlined.

DISCUSSION

The **President** (Mr. H. Blythe, Colwyn Bay) said it was an exceptional achievement for Mr. Wright to have prepared such a paper at such short notice. They had not yet seen much of Mr. Wright in North Wales but they were hoping to see more of him in the future; the more they knew of him the more they felt the Board had the right man in the right place. His only comment on the paper itself was that in his experience he had found that calorific value recorders should be provided with a short supply pipe so as to eliminate the time lag for the gas which was being recorded, or alternatively there should be some means of continually purging the pipe.

Mr. **W. Clark Jackson** (Neath) said he had always felt there must be an order of sequence in the gas industry, and one of the first considerations was coal quality. The quality of the coal received at the works had a great bearing on the conditions in the works and the results they were able to obtain. They had fought for coal quality for a great many years. To a great extent the quality had improved, but some of them felt there was still a long way to go before they got what they ought to have in the mater of coal quality. In the case of ordinary everyday commodities if they did not get the quality they wanted they either changed their shops or made a complaint, but with coal they had to make do with what they received. He believed the Coal Board were most desirous of improving the quality of the coal, but there was still much to do. He suggested that when they received coal which they considered was not up to quality they should inform the Coal Officer straight away, not by making a general statement but by putting forward facts and figures justifying their complaint. Once they got their coal right it was up to them to provide the other services in the works and on the district which would enable their undertakings to give standard quality gas to their consumers.

Mr. **O. P. Cronshaw** (Rhyl) said many of the matters raised in the paper seemed simple, but it was timely that they should be reminded of the simple things. He entirely agreed with the author's remarks on extractor speed. On the question of vertical retorts generally it was an unsound policy to allow a retort to come near to the end of its life and then say they must do something about it. There should be a proper programme of maintenance to keep the quality right.

A Remote Indicator

Mr. **A. Pickard** (Llanelly) agreed with the President that there should be short services for calorimeters. He had spent a good deal of attention on that matter 12 months ago and found a firm which would provide an electrical remote indicator. By such means it was possible to install instruments in a position where it was easiest for the operatives to see them.

Mr. **H. B. Kendrick** (Conway) expressed his personal gratitude

to Mr. Wright for having stepped into a breach only a fortnight before the meeting. The adoption of electrical drives did not always produce constant results. In his undertaking he had had considerable trouble with variations in electrical pressure. They were at the end of the main and they had found it necessary to put in variable gearing to correct the variation in the speed of the extractors. He was especially interested in the question of dilution. He had continuous verticals and the plant was getting too small for the district. They had tried to increase the capacity of the plant by producing a higher quality gas, diluting it and bringing down the calorific value by producer gas. The arrangement had the advantage that it was easy for the attendant to maintain a constant calorific value. There was, however, a difficulty after having had a fairly straight specific gravity for some years in connection with Ascot multipoint heaters. The trouble was so extensive that he had had to change all the burners; he had had to get burners with a lower range.

Mr. **K. E. Tiddy** (Carmarthen) emphasised the importance of keeping the stokers acquainted with the principles of the operations carried out in order that they might take a real interest in what was happening. In his view a specific gravity recorder was just as important as a calorific value recorder.

Mr. **E. M. Edwards** (Wales Gas Board) said he was in a position to know the immense amount of work involved in preparing such a paper and he paid tribute to Mr. Wright for the able and willing manner in which he had carried out the task. With regard to the rate of extractor speed his own inclination was for the recorder to be operated from the main extractor cross bar rather than from the engine speed. A large number of extractors were belt driven, and a slip on the belt would give rise to variation in speed.

Plant Maintenance

He was glad to hear some of the speakers refer to the necessity for plant maintenance. Unless a plant was well looked after they could not possibly evolve any systematic or reliable method of calorific value control. While it was right to talk about improving the standards of gas quality he questioned whether it was fair to ask the operatives to display and accept responsibility for greater intelligence in carrying out their duties. He suggested that they should make sure that the selection of personnel was right before they expected operatives to display a higher standard of intelligence. He was a strong believer in the effect of clean well-operated works on the background and mentality of those engaged in the works, and he did not think they could expect to be successful in true scientific control of gas undertakings unless they were satisfied that their works were well maintained and kept scrupulously clean. They must get the workmen themselves to have a right sense of responsibility and see that not only were the works kept clean and well maintained but that the personal and welfare conditions of the men were right.

Mr. **J. Wood** (Bangor) ventured to suggest that it was incumbent on the officials to devote more time to the smaller works than to the larger ones, because they most needed help. He wondered how the men in the very small works were going to conform to the regulations made under the new Act; they had neither the plant nor the technical staff. He was well aware that some undertakings were sending out gas of a calorific value miles below what it ought to be. He was one of those gas men who believed that the age of the horizontal retort had not yet passed. The question of steaming of horizontal retorts had never been gone into as it should have been; there was a lot more in it than some people seemed to think.

Mr. **F. W. Croxton** (Llandrindod Wells) suggested the possibility of mixing straight coal gas and producer gas in the holder as a means of attaining the required standard calorific value.

Mr. **D. Muir** (Pontypridd) asked whether consideration had ever been given to the use of gas engine driven drives for the extractors. His impression was that the stokers might take a keener interest in the quality of the gas in order that a steady speed might be obtained.

Mr. **Darrell W. Rees** (Pembroke) said he was very interested in quality control and he challenged the use of the word 'luxury' in reference to a calorific value recorder. Even for the smallest works a recorder was a necessity, and he suggested that the operative words in Mr. Wright's paper were 'have been.' He hoped that it was the intention of the Gas Board that even the small works would get such instruments in future. Reference had been made to the necessity for some control of exhausters. He had had some experience in trying ot control recorders within very fine limits, and in the case of exhausters there were several factors affecting the matter. The steam input was a very important factor, and if one could control the pressure of the steam by using a suitable type, preferably a relay type, of reducing valve, one would have eliminated one big factor.

The Author's Reply

Mr. **Wright,** replying to the discussion, said Mr. Pickard had offered a useful suggestion on the use of electrical remote recorders. It was necessary, of course, for the calorific value recorder, of whatever type it might be, to be somewhere where the men should be able to see it, so that they might take the necessary action. He was grateful for Mr. Clark Jackson's remarks on coal quality, and he would add that it was necessary that samples of the coal complained of should be submitted. A start was being made with a technical advisory service, and undertakings would be provided with sampling tins, so that if they received doubtful supplies of coal they could have means of submitting samples. The matter had already been taken up in the case of one small works, and he hoped it would be extended. There had been a lot of discussion on extractor speeds and he was certain that the points were appreciated by everybody. He thought Mr. Muir's suggestion about the use of gas engine drives was one of the brighter lights of the meeting. Perhaps they had read more into his remarks than he had intended. His own view was that such an arrangement might introduce a further possibility of variation, and he would hesitate to recommend it.

Dilution with Producer Gas

The question of dilution of coal gas by producer gas had been raised by Mr. Kendrick. There had been an excellent paper on that subject from Liverpool recently, with figures. Mr. Kendrick's remarks about troubles he had had with multipoint water heaters served to emphasise that the combustion characteristics of the gas must be suitable for existing appliances unless they were to be faced with great expense on the district. Mr. Tiddy's reference to specific gravity recorders was interesting. If there were likely to be large variations in specific gravity the installation of a recorder would obviously be very desirable. In normal cases he felt that the calorific value recorder, coupled with spot tests of specific gravity, would serve the purpose without the expense of installing an expensive instrument which was going to give a straight line. With regard to the remarks of Mr. Edwards and Mr. Rees on the question of belt and extractor wheel slip, it was appreciated that they must cut out all possibility of error.

Mixing rich coal gas with producer gas was a question raised by Mr. Croxton. The principle generally adopted was that producer gas was drawn into the fuel main by means of an exhauster and mixed with the rich coal gas as it went through the purification plant, and then passed into the holder. The only mixing in the holder was a slight variation in quality; it was not a question of mixing the two gases at that stage. A calorific value recorder had in fact been a 'luxury' in many instances, but he hoped it would be the policy of the Wales Gas Board to provide such an instrument where it was necessary.

Mr. **J. F. Rust** (Newport) proposed a vote of thanks to Mr. Wright for his paper.

Mr. **J. Powdrill** (Pontypool) seconded and said he hoped that the question of instrumentation at gasworks would be encouraged. There should be no such thing as not being able to afford instruments; indeed he wondered how works had managed without them. Mr. Wright had given him the impression that calorific value was now the responsibility of the Area Board, and he asked for some enlightenment on the point.

Mr. **Wright** briefly acknowledged the vote of thanks, and in answer to Mr. Powdrill he said that the onus was laid upon the Area Boards for maintaining the calorific value of the gas supplied. No reference had been made in the paper to the idea of the Board choosing the calorific value, and Mr. Powdrill need have no fear on that point.

FEEDING THE MODERN MULTITUDE

Gas played a worthy part in one of the largest open air parties ever staged in the north-west on May 27. The 75th anniversary of the first production of soda ash at the Winnington Works, Northwich—now the Alkali Division of Imperial Chemical Industries, Ltd.—was celebrated at a gathering of 23,000 employees, pensioners, and their families on the Jubilee Field.

About ten tons of liquid tea was consumed, the boiling water for tea-making purposes presenting a particular achievement for gas. The Runcorn-Northwich gas undertaking of the North Western Gas Board was called in prior to the event and given a free hand to supply equipment to meet these abnormal requirements. This was accomplished by the setting up of six batteries of boilers at key points to cover the marquees where food was served. Five batteries each consisted of two 'Magna' instantaneous water boilers and six 10-gal. domestic wash boilers. The sixth battery, which was sited to meet heavier demand, consisted of two 'Magna' No. 3 boilers and 34 10-gal. domestic boilers. These units supplied all the boiling water for tea, washing up, and staff teas. Between 3.30 and 5.30 p.m. it was estimated that 90,000 cups of tea were provided. The water meter registered 31,000 gal. consumption, and the total gas usage was 100,000 cu.ft.

In a congratulatory message, I.C.I. informed the gas undertaking that Agars, the caterers, had reported that at no time was there any lack of boiling water. For the event, the undertaking laid 457 yards of gas main, 334 yards of 3 in. water main, and 840 yards of water and gas connections. Messrs. James Stott & Co. (Engineers), Ltd., provided without charge the 12 'Magna' boilers which were largely responsible for the success of the undertaking.

FACTORS INFLUENCING THE LIFE OF VERTICAL RETORTS*

By H. KERR, M.INST.GAS E.
(Director, the Woodall-Duckham Company)

IN the past 20 years the writer had the opportunity of inspecting many retorts let down for repairs. These had carbonised practically all types of British coals, produced high and low grade gas, and worked under various conditions of output. The installations included continuous vertical retorts, intermittent vertical chambers and coke ovens. It was felt, therefore, that a summary of this experience might be of interest in view of the different facts observed between continuous and static carbonisation.

In continuous vertical retort practice the coal travels downwards through the retort more or less continuously. The coke, after extraction by a mechanical device, is discharged to atmosphere in a reasonably cool condition about every two hours. The carbonisation of coal in continuous vertical retorts is a combination of both high and low temperature effects resulting in the production of gas having a lower H.E.V., much less naphthalene, a lighter tar, a lower benzole yield and a less dense but more freely burning coke than by static carbonisation.

In the static methods the coal charge remains stationary throughout the whole period of carbonisation. The coke produced is discharged from the chamber in a red-hot condition. Steaming, when it is part of the process, usually only takes place during a limited period towards the end of the carbonising time. In the latest system of static retort carbonisation the coke is discharged from the retorts at a reasonably low temperature.

The Static Vertical Retort

The static vertical retort consists fundamentally of an intermittently operated unit in which a coal charge occupies approximately the upper four-tenths of the internal height of the unit and stands on coke from the previous charge and from which blue water gas ascends. The coal is carbonised in 9 to 10 hours while stationary. The charge is then lowered through its original height by the measured extraction of coke from the unheated tower part of the retort. After the insertion of a small pad of loose coke to prevent coal slip the heated upper part of the retort is recharged with coal to the top. Steam, controlled to maintain the desired calorific value of the gas, is admitted to the lower part of the retort practically throughout the whole of the carbonising cycle to cool the coke and to make water gas. The process conserves hydrocarbons in the coal gas.

The fundamental differences between gasworks and coke oven practice affect the life of the brickwork. Whereas a coke oven plant can normally be expected to have a working life of 15 to 20 years before rebuilding is necessary, it is more usual for gasworks retort or chamber installations to require rebuilding about every 10 years. Normally, during the working life of a coke oven battery no major brickwork repairs are necessary, but the oven jambs and doors must receive careful maintenance. During the overall working life of most gasworks installations two or more repairs have to be carried out to certain areas of the brickwork. When comparing the working life of coke ovens with continuous and static retorts it is important to remember that usually the coke oven plant works consistently throughout its whole life as a base load plant at a more or less even output. Also, in Great Britain, steam is not passed into coke ovens to dilute the calorific value of the coal gas.

Type and Grading of Coal

The type and grading of the coal in conjunction with the calorific value of the gas to be made determine the actual carbonising which can be obtained, the maximum coal throughout and therefore the output from the plant. The nature of the coal also has a bearing on the kind of plant best suited for its treatment. For any given type of coal the nut grade gives the highest daily output, while singles, run-of-mine and slack coal give correspondingly lower figures. The gas make per ton at a given calorific value remains constant for any single type of coal irrespective of the grading. Obviously, the coals best suited for gasmaking are those which give a good thermal yield of gas and which make reasonably strong coke having a low ash content. These coals when corrected to a basis of 8% ash plus moisture normally have volatile contents varying from 32 to 36% and British Standards Swelling Numbers from 3 to 9. Continuous vertical retorts satisfactorily carbonise some of the highly swelling Durham, Somerset and Kent coals, but when possible it is better to use coals of the lesser swelling types. The lower swelling coals give easier and more regular travel and also more easily steamed charges, a point of importance when low calorific value gas is required. Coals having the higher swelling numbers can best be carbonised by static carbonisation but those having a volatile matter content lower than 28% and a swelling number of 9 may give rise to excessive and even dangerous pressures in the retort. This is a matter of major importance in coke oven and intermittent vertical chamber practice. British coals having a volatile content higher than 36% usually give a poorer quality coke due to the lower coking properties of the coal and, what is of equal importance, the gas yield and calorific value of the 'straight gas' are lower than in the case of good gas coals.

Table I summarises the average analyses of various gas coals corrected to a uniform basis of 6% ash in order to obtain a truer comparison. It will be appreciated that the figures are given merely to indicate the general trend. Wide variations occur in practice.

TABLE I.

Type of Coal.	*Analyses %*			*Cu.ft./ton of 500 B.ThU.*	*Swelling Number*
	Vol. Mat.	*H_2O.*	*Ash.*	*Gas.*	*B.S.*
Yorks. and Lancs. ...	34	2	6	15,600	3—9
Durham	33	2	6	15,270	6—9
Midland, Derby, Notts, Staffs, &c.	36	2	6	14,300	1—7
Fife and Lothian ...	35	5	6	13,600	1—8
Lanark and S.W. Scots.	33	5	6	12,300	1—6
S. Wales	32	2	6	14,300	3—9
N. Wales	36	2	6	14,300	4—8

The table also shows the make per ton and the swelling properties of the different types of coal.

Ash an Important Factor

The ash in the coal is an important factor in retort life and this ash varies in quantity and quality from coal to coal. Unfortunately the variations are such that no general average can be given for a particular coalfield and numerous tests show a very wide variation even from pit to pit.

Table II indicates the range of temperatures in which the ash from different kinds of coal commences to fuse in a reducing atmosphere.

TABLE II.

Coal Type	*Commencement of Fusion.*
Yorkshire	1070–1455°C.
Derby, Staffs and Notts.	1090–1300°C.
Duram	1100–1300°C.
N. Wales	1100–1250°C.
Scotland	1200–1520°C.
Somerset	1070–1200°C.

It will be seen that ash in the gas-making coals from Scotland is the least fusible, while that in the Somerset and North Wales coals is most fusible. It is, however, interesting to note that some of the Yorkshire and Midland coals contain easily fusible ash. Obviously, the lower the fusion temperature of the ash the more likely is the retort brickwork to be affected. Volatile inorganic and organic salts present in the coal pass away from the retort with the coal gas. Silica brickwork in the retorts is relatively immune from the attack of sodium chloride, but nevertheless, the salt content of the coal should be known because of its effect on the firebrick work. From tests carried out it would seem that the gas-making coals from Yorkshire usually contains up to 0.4 NaCl, although figures up to 0.8% have been found. The Durham coals usually have 0.1% to 0.5%. Normally the salt content of any gas should not exceed 0.3% or 0.4%.

Total sulphur in coal varies widely from 0.5% to 2.5%. Broadly speaking, the coals from Wales and Scotland have a lower sulphur content (0.5% to 1.5%) than those from Yorkshire, Durham, Midlands, and Somerset. These may contain from 0.7% up to 2.5% sulphur. The volatile sulphur in the coke is also important as this can lead to attack in the chimney brickwork, particularly near the top.

On the assumption that the plant has been designed for normal carbonising conditions the life of a silica retort usually depends upon the degree of spalling, the incidence of alkali attack, slagging and leakage in the retort face. The wear and tear due to abrasion by the coke in vertical retorts is relatively small. Instances have occurred where retorts have been used for the experimental blending of alkali with coal to produce more easily

* Paper presented to the Yorkshire Junior Gas Association.

combustible coke. Dangerously swelling coals have been carbonised particularly during the war years, and in France and elsewhere retorts have been used as gas and oil-cracking chambers. These out-of-the-ordinary conditions may affect the working life of the retorts.

Damage to Brickwork

The damage which takes place in all kinds of carbonising plants usually occurs on that face of the brickwork in contact with the coal charge. The attack in the combustion flues due to dust, as shown in Fig. 1, rarely becomes sufficiently serious to cause the shut down of a plant for repair. With some types of coal the action of flue dust is troublesome and may be serious, but normally the difficulties can be reduced or even overcome by attention to the carbonising temperatures although when retort leakage occurs this control becomes more difficult. It is interesting to note that Fig. 1 also clearly shows the attrition of the air nostril bricks caused by the dust carried in the air from the retort house.

In continuous vertical retorts the chief forms of damage are due to alkali attack in the top firebrick work, spalling in the upper silica work, and slag and leakage due to the ash attack in the lower areas of the silica.

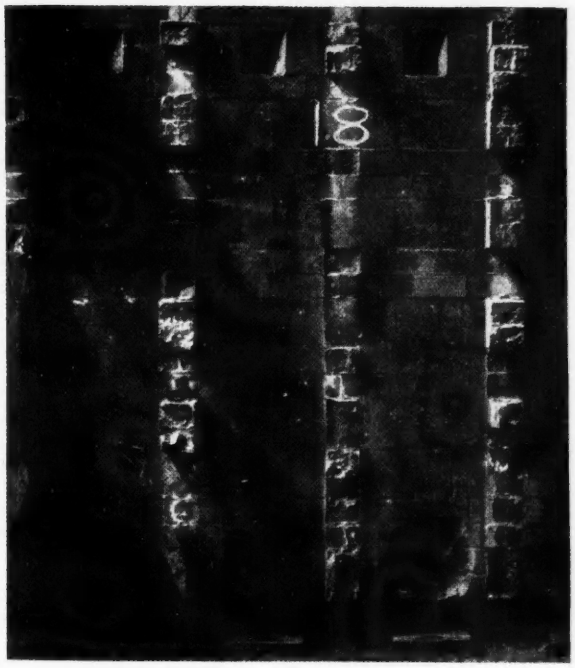

FIG. 1.—*Typical condition of vertical heating flues. Upwardly heated continuous vertical retorts.*

The chief reasons for repairs in intermittent vertical chambers are general deterioration of the brickwork caused by movement of the chamber walls, due to the coal swelling pressure developing cracks and leakage in the brickwork. Air infiltration through leaking doors causes slagging of the silica, and excessive moisture in the coal, particularly in coke ovens, often causes damage. The retort brickwork absorbs inorganic compounds such as iron salts and alkalis normally present in the coal. This absorption is accumulative and may not show immediate deleterious effects. The absorption of these compounds, however, results in lowering the refractoriness of the brickwork, and it should be appreciated that most forms of deterioration and damage occur more rapidly with increased working temperatures, irregular working conditions, bad scurfing control and inefficient attention to detail. It is therefore of primary importance to ensure, apart from the normal control of combustion flue temperatures, that no local overheating of the brickwork occurs due to hanging charges or ingress of air into the hot charge.

The Top Section

The top section of a continuous vertical retort consists of fireclay material to reduce spalling effects, but some of the alkalis attack this section of the retort. The silicates formed are more dense than the original brick substance and this attack results in the face of the brick crazing and curling, as shown in Fig. 2. In time the crazed areas break entirely away leaving new areas

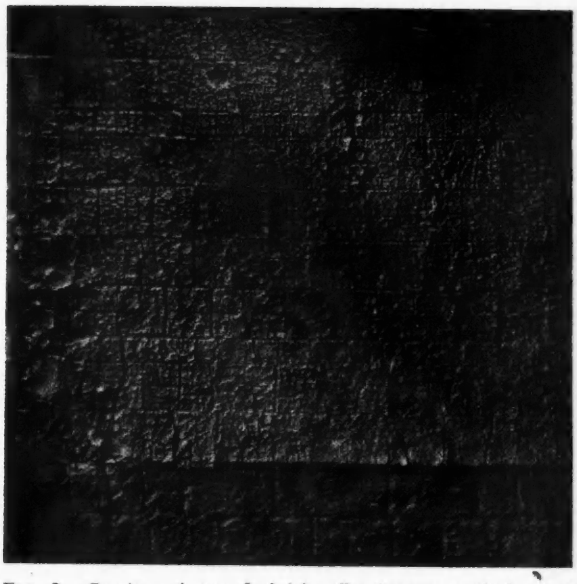

FIG. 2.—*Crazing of top firebrick. Continuous vertical retorts.*

for further alkali attack and a rough surface which may seriously hinder the travel of the coal.

Since modern carbonising conditions demand working temperatures beyond the safe limits for firebrick in the hottest zones, a belt of silica (usually about 15 or 16 ft. deep) is incorporated below the top firebrick. As shown in Fig. 3, it is in this zone that 'spalling' always occurs in continuous vertical retorts. The spalled area is always in that section of the silica work immediately below the top firebrick, whether the retort be heated with the hottest zone near the top or near the bottom. The damage usually extend several feet down the retort, the actual depth depending on the calorific value of the gas made and the type of coal carbonised. Spalling is usually observed from nine to 18 months after putting the plant to work and is seen when the edges of some of the bricks have fractured and fallen away. This fracturing gradually extends over the entire surface of the brick but appears to be most severe during the initial stages. Retorts carbonising the more highly swelling coals and producing high calorific value gas usually show the earliest signs of spalling Furthermore, spalling occurs most quickly in retorts having the maximum flue temperatures near the top, but although the in-

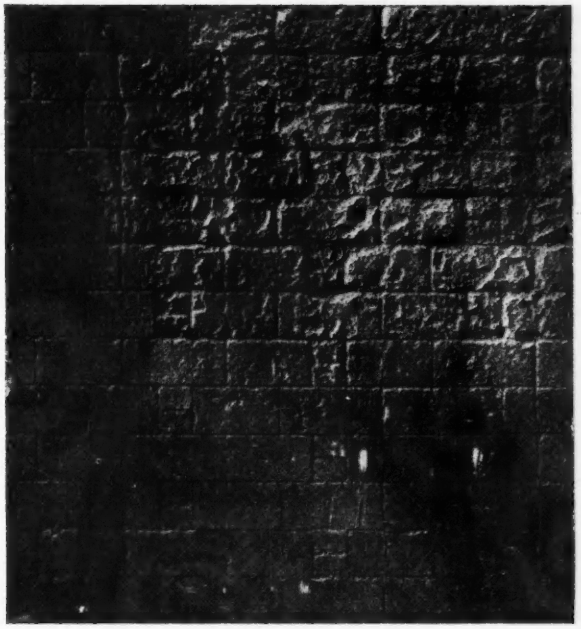

FIG. 3.—*Spalling of upper silica. Continuous vertical retorts.*

tensity of spalling into the brick is more noticeable, the area down the retort face is not so great as in retorts with the maximum flue temperatures near the bottom. The newly fractured face of the spalled brick is apparently clean and free from chemical attack and for some years the effect was thought to be entirely due to alternating expansion and cooling stresses set up in the silica brick by the intermittent travel of the coal down the retort. It is now becoming more and more accepted that spalling may be largely due to carbon penetration. Spalling is most marked in the silica zone where the majority of the scurf accumulates. In this zone hydrocarbon compounds, gaseous or liquid, probably enter the pores of the retort face, become 'cracked' by the higher temperature in the brickwork itself and gradually develop stresses in the material thereby causing hair cracks in, and subsequent fractures of, the silica.

Scurf Troubles

Scurf is a very strong and tenacious substance which, while being burnt off during the scurfing period, expands and curls away, thus aggravating the fracture of the brick. Pieces of spalled silica can often be observed attached to scurf removed from continuous vertical retorts. In a new installation of retorts the joints between the bricks are more porous than the brick itself, and the carbon compounds enter the joints rather than the brick surface. Any expansion pressures developed due to changes in volume of the carbon compounds will, therefore, be most marked in the joints. The skin of the brick is the strongest and most impervious part and the first fractures can be expected to disrupt the largest pieces. Later on, when the inner and softer portion of the brick is exposed, spalling is usually observed as smaller shell-like pieces of brickwork. Spalling similar to that seen in continuous vertical retorts is never observed in intermittent vertical chambers nor in coke ovens except at the jamb bricks. In both these forms of carbonising plant, coal, sometimes very wet, is charged in the course of seconds into the red-hot chambers. That is repeated every 10 to 20 hours and if thermal expansion stresses were the only cause, these conditions should be sufficient to produce some spalling effects after a period of years.

Also, whereas the continuous vertical retort is scurfed only every 18, or even 90 days, the intermittent vertical chamber and coke oven undergoes some form of scurfing each time the chamber is emptied. It is suggested that the scurfing which normally occurs in the static systems reduces the carbon penetration effects in the brickwork and consequently limits the degree of spalling. It would be interesting to compare over a period of years the spalling in a continuous vertical retort, operated under conditions where it could be scurfed at least every week, with similar retorts scurfed normally.

Silica Coke Ovens

Modern silica coke ovens consist of horizontal chambers some 40 ft. long, 12 to 14 ft. 6in. high and 16 to 18 in. wide. The coke is pushed out horizontally from the pusher side to the coke side and the oven is usually some 2 or 3 in. wider at the coke side to assist the coke removal. To ensure even carbonisation, the coke side temperatures are hotter than those on the pusher side to compensate for the increased width of the charge. The oven doors retain the coal in the oven and during the coking period tar condenses and becomes 'cracked' into pitch and carbon between the door seals and the oven wall jamb bricks. The oven doors and jamb bricks on both sides of the oven normally receive the same mechanical treatment with regard to door removal, &c., but it is usual to find on most coke oven plants that the coke side silica jamb bricks spall at a much earlier date and at a much quicker rate than those on the pusher side. The difference in spalling is probably due to the carbonised tars around the coke side doors creating a bigger disruptive force in the jamb bricks due to the higher temperature conditions. Actually, in coking practice it is usual to find that the door seals on the coke side are more difficult to clean than those on the pusher side because of the harder form of pitch and carbon.

The above explanation for this limited degree of spalling in coke ovens falls into line with the reasons given for spalling in continuous vertical retorts where the incidence of scurf affects the rate of spalling. Hanging or irregular travel of the coal charge in a continuous vertical retort will encourage scurf formation, blistering of the already formed scurf and increased damage to the retort face. Scurf is not normally observed in the lower portion of a continuous vertical retort or intermittent vertical chamber, unless gas of relatively high calorific value is made. The water gas produced by the action of the retort steam on the hot coke tends to keep the lower brickwork clear of carbon. However, the steam travelling up between the retort face and the hot charge liberates ash from the coke, thereby enabling this ash to attack the adjacent and, more or less, carbon-free brickwork. The rate of the attack naturally depends on the type of ash in the coal, the amount of steam entering the retort, and the temperature of the retort face. The inorganic compounds in the ash attack the silica and lower the refractoriness, particularly in the lower section of the retort where no scurf remains. The jointing cement is less resistant to ash attack than the original brick, and it is not unusual for slag to penetrate the joints thus bringing about retort leakage. (See Fig. 4.)

The retort brickwork must also contract or expand with changes in temperature, and in intermittent vertical chambers and coke oven practice additional brickwork movement occurs due to pressures set up by the coal. These effects may bring about cracks in the joints and even through the bricks themselves, thereby introducing other sources of leakage. The carbonising conditions inside continuous vertical retorts are entirely different from those operating in intermittent vertical chambers and coke ovens. In continuous vertical retorts the charge is normally always on the move and the 'steaming' is continuous. With intermittent vertical chambers the charge is static and the carbonisation is carried out without steam except for a relatively short period towards the end of the cycle. In the static systems, therefore, the conditions during the carbonisation of the charge are more conducive for the formation of carbon over *all* the brick surface, and in the brick joints, thereby giving better conditions for obtaining tight brickwork and freedom from leakage than in continuous vertical retorts.

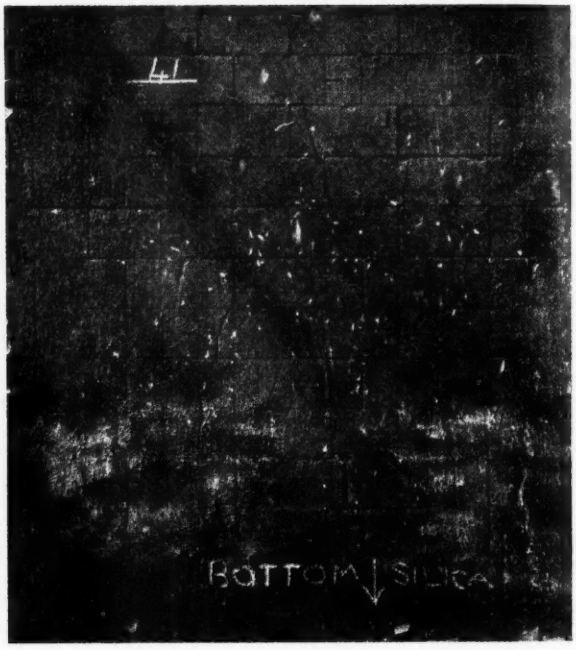

FIG. 4.—*Ash attack and typical condition of bottom silica. Continuous vertical retorts.*

Charging Methods

The method of charging intermittent vertical chambers and coke ovens tends to give a dense coal charge, and care has to be taken to avoid the use of coals having dangerous swelling properties. Most coals develop some pressure on the chamber walls during carbonisation and this pressure tends to move the wall. If the movement is appreciable, then in time vertical cracks develop through joints and brickwork, and the corners of some of the bricks break away. This type of brickwork fracture, see Fig. 5, is usually only seen in intermittent vertical chambers and coke ovens and it should not be confused with the true spalling in continuous vertical retorts. During the static carbonisation of the charge, due to the swelling pressure developed in the coal, the walls of each chamber tend to move out. Each end wall of the setting rigidly supports the adjacent chamber wall which is, therefore, sufficiently strong to withstand the pressure developed. The inner wall of each *end* chamber has to resist the entire pressure developed, and these particular walls move more than the remainder.

The heating flue arrangement of intermittent vertical chambers and coke ovens is similar in that the walls of two adjacent chambers form the outer walls of the heating flues. It is interesting t note that when wall movement occurs in either of these systems it is usual to find the first effect of this in that heating wall next but one to any pinion or end wall. On the other hand, continuous and static vertical retorts are built as complete monoliths, each series of combustion flues having a back wall bonded to,

or supporting, the retort face wall. These two types of retorts do not suffer from spalling caused by coal pressures.

Retort Leakage

Retort leakage is probably one of the major factors bringing about repairs. Coal gas or water gas passes from the retort into the combustion flues, causes overheating of the brickwork and thereby intensifies and extends the area of damage both on the retort face and in the flues. Alternatively, under certain conditions of working, fuel ash carried in the producer gas passes from the flues into the retort itself and assists in the attack on the retort face. Obviously it is of primary importance to attend to retort leakage as soon as, and even before, the signs of it are apparent. Methods of reducing leakage have now been successfully developed and everyone should be fully aware of the Airborne Cement Process for filling hair cracks and for overcoming incipient leakage, and the Cement Welding Process for making good all types of leakage including

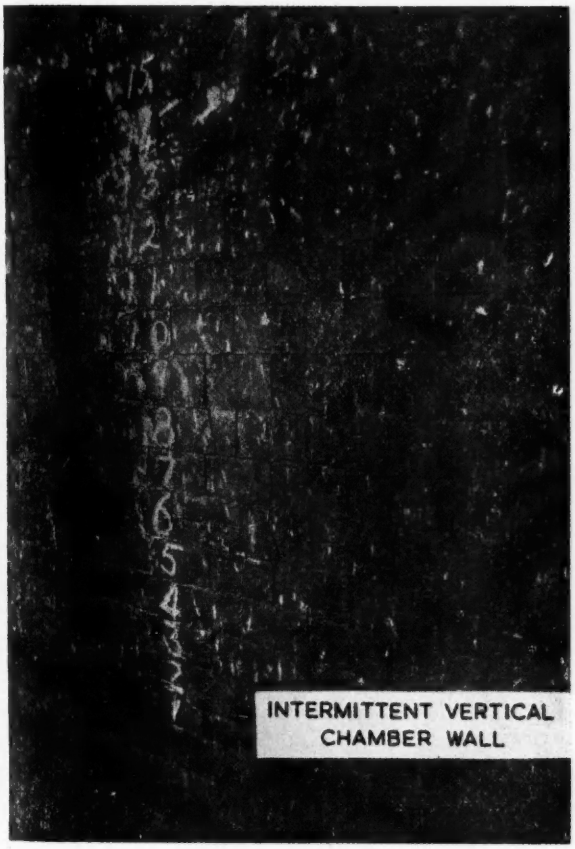

FIG. 5.—*Typical condition of silica and bottom fireclay work. Intermittent vertical chambers.*

large holes. Details of the different processes can be obtained from the Technical Press, and it is not intended to discuss the pros and cons of the different methods. There is, however, a definite tendency to prefer the 'dry' application of cements to silica by the Cement Welding or the Airborne Processes. It is becoming more and more common to use the cement welding technique for actually building up eroded silica areas of several square feet and one or more inches deep, particularly in coke oven plants. In effect the Welding Process can be looked upon as a secondary supply of silica. Retort leakage should always receive early attention by expert and interested personnel. Bad workmanship and poor supervision may lead to more serious damage in the long run. It is also important to remember that retort leakage in upward heated retorts is more serious than in the downward heated types because of the hotter flue temperature conditions which occur in the region where this leakage occurs.

The bottom section of the brickwork in vertical retorts consists of several courses of firebricks. This section normally requires little repair except when unusual conditions have occurred. Should the brickwork become overheated, due to air infiltration through the bottom doors or ironwork, then damage may result from slag attack. The bottom ironwork forming the retort coke hopper and the extractor box are usually so constructed that any necessary replacements and repairs can be carried out during scurfing. The factors causing damage to bottom retort ironwork are usually under the control of the supervisor.

Leaking Joints

Obviously, leaking joints, partially open bottom doors, and unmade seals can quickly bring about overheating, warping and cracking of the castings. The wrongful admission of air at the base of the retorts can also bring about serious overheating of the lower retort brickwork apart from lowering the thermal output and increasing the inerts in the gas. Overheating of the bottom ironwork can also be caused by high coal throughputs, blocked steam nozzles, stopped coke water-quenching sprays, and bottom pressure in the retorts. It is most important to note that overheated bottom ironwork, due to any cause, results in weakening the floor joists supporting the retort bench. Instances have occurred where the retort brickwork has partially collapsed due to this cause.

The retort top ironwork consisting of the auxiliary coal hopper, mouth-piece casting and coal deflecting plates are all supported by the top brickwork. It is essential to keep these items tight against air infiltration. The chief factor causing overheating and warping is usually high temperature developed during careless scurfing. Modern methods of scurfing where the air passes as a 'U' stream through the retort, in addition to cooling the top of setting, lessen the damage to the retort mouthpiece and other ironwork. With regard to the remainder of the retort bench, the producer brickwork suffers only in localised areas due to ash attack; the rest of the producer gas flues normally remain in good condition apart from dust accumulations which should be periodically removed. Naturally, if the flues do not receive regular inspection and attention leakage of air into the flues may develop, overheating will occur and damage to the flue brickwork will result. A frequent source of overheating is air entering the producer battery gas stream via an isolating damper which has not been correctly shut and sand sealed when one of the producers has been let down cold for repairs.

Although the major damage to the retort brickwork occurs on the retort face, serious damage has occurred when ash carried over into the combustion flues became fused. It is essential to clean systematically all working flues and maintain all dampers and control points in working condition. This attention is perhaps best undertaken each time the retort is scurfed, but obviously any method of reducing dust is important.

In coke oven practice, blast furnace or producer gas is frequently used as the heating fuel. These gaseous fuels both contain dust, and to avoid dust settlement in the regenerators and flues in the ovens the lean fuel gas is washed, cooled and usually passed through an electrostatic dust precipitator to bring the dust content down to less than 0.009 grains per cu.ft. before it enters the setting. It is also important to remember that the flow of the heating gases in modern coke oven plants is reversed every 20 to 30 minutes. Therefore the average temperature in the combustion zone is lower than in gasworks settings.

In gasworks practice, particularly the non-recuperative setting, the settlement of dust is not so vital a factor as in coke ovens. Nevertheless, there is at present a tendency to use mechanical producers which enable efficient dust separation to be incorporated The steadier condition in the fire bed due to the continuous mechanical withdrawal of ash results in easier control, more uniform temperature conditions, and less dust in combustion flues.

Conclusions

It is generally recognised that the working life of any type of carbonising plant depends almost entirely on the use of suitable coal and heating fuel, safe carbonising and efficient maintenance.

Unfortunately it is becoming less and less possible for the average gas engineer to choose the types of coal he desires and it is important to bear in mind that it may not be possible to get the results obtained from one type of coal when other kinds have to be used. Attempts to 'drive' the plant in an effort to achieve the impossible can only lead to rapid deterioration of the brickwork because of the higher temperature conditions.

Poor supervision of any plant encourages high overall maintenance costs, but even under the most efficient conditions the coal used affects the retort brickwork. The main areas of the damage have been described and the importance of attending to retort leakage has been stressed. The photographs referring to continuous vertical retorts show the entire face of one retort after 4½ to 5 years' working. The coals carbonised were Yorkshire Nuts and the calorific value of the gas made was 480 B.Th.U. per cu.ft.

All coals form scurf due to overcracking in the retort, but this can be controlled to some extent by the temperature conditions at the top of the retort, the regularity of coal travel, and the calorific value of the gas. It is emphasised that high top temperatures also increase the tendency for alkali attack in the top firebrick and thereby encourage irregular coal travel.

The highly swelling coals tend to form scurf more quickly than the less swelling types and there is evidence that the smaller grades give more scurf than the nut grades of the same coal.

The production of high grade gas increases scurf formation and tends to increase spalling in continuous vertical retorts, but the use of less steam in the retort definitely reduces ash attack in the lower section of the retort. The overall effect is beneficial to the life of the retort since the presence of carbon in the joints, &c., gives tighter brickwork, less retort leakage and less erosion of the lower silica work.

Today some carbonising plants make high calorific value gas in the retorts, using the minimum of steam to cool the coke. The rich gas is diluted externally to the retort by either water gas or producer gas.

External dilution by water gas is suitable for large plants but the smaller units may incorporate producer gas dilution.

The further tendency to include mechanical producers, although costly, should result in more uniform temperatures, better control, less dust troubles in the flues, and improved working amenities.

It has been suggested it should be possible to overcome retort damage by altering the type of refractory material. The solution, however, is not so easy as might first appear. The designer of any carbonising plant has to ensure a reasonably gas-tight unit, and the use of two or more different refractory materials introduces structural and bracing problems. The contractor endeavours to use the best and most suitable material available for the particular duty required, and the British Ceramic Research Association is carrying out very valuable work on this subject. There is, however, still much to be learnt and recently it has been observed that spalling in continuous vertical retorts is practically unknown in France. Many retorts inspected after 3 to 5 years' work showed no spalling, and the chief reason for retort repairs in France was stated to be due to ash attack and retort leakage in the lower section of the retorts. It is possible therefore, that some difference in technique in the manufacture of silica bricks in France may account for the absence of spalling since British coals are frequently used and scurf is found in the retorts in France.

The problem is being carefully investigated by the British Ceramic Research Association and the Woodall-Duckham Company, and samples of French silica bricks are to be tried out in England. The post-war conditions have delayed the progress of the investigation but it is hoped that some definite information will be available in a year.

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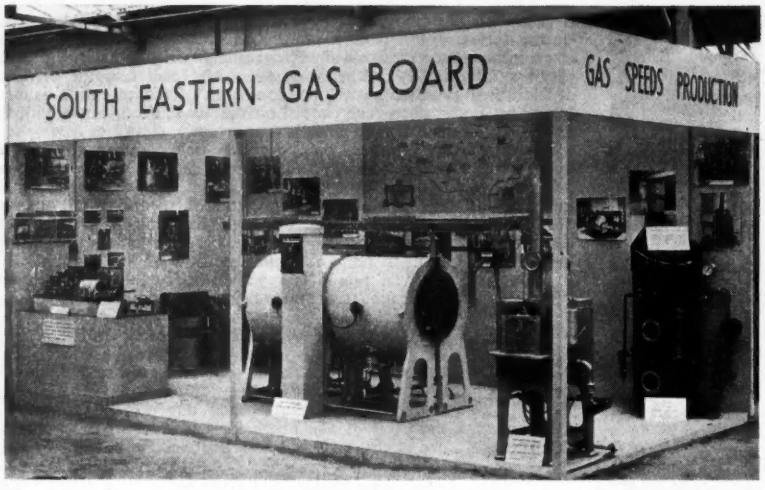
MEDWAY INDUSTRIES EXHIBITION

The Rochester undertaking of the South Eastern Gas Board had an effective stand at the Medway Industries Exhibition held in Chatham May 21-28 inclusive. The exhibition was designed to show the variety of products manufactured within the Medway Towns, and the Rochester undertaking determined to show some of the industrial processes which were available and applicable within the towns.



The exhibit comprised a 2 ft. diameter infra-red tunnel, 6 ft. long, having a conveyor running across the top and being fitted with a pyrometer to indicate the temperatures of the panels. Paint drying demonstrations were given continuously in this tunnel. A gas-fired steam boiler which was ordered by a large local bakery was also displayed, together with a general purposes furnace.

The undertaking was fortunate in obtaining a small working model of an infra-red tunnel which had been used in the British Gas Council's exhibitions at Gas Industry House, and this attracted much attention. Photographic enlargements of various industrial processes, some of them from local works, were displayed on the walls of the stand. About 30,000 people visited the exhibition which was considered a very great success.

GAS UNDERTAKINGS' RESULTS

Primitiva Holdings, Ltd.

In a statement circulated to shareholders, the Chairman says that the Primitiva Gas Company's accounts for the year ended Dec. 31 disclose a loss of £22,389 compared with a loss of £20,959 for the previous year. Both of these figures represent the net cost of maintaining the considerable organisations on both sides of the Atlantic necessary for prosecuting the suits before the Argentine courts. All expenses thus incurred will form part of the claim against the Argentine State Gas Department. In the Gas Company's balance sheet the main variation is the reduction in the carry-forward by the loss of £22,389 from £49,644 to £27,255. The Province of Buenos Aires Gas Company continued operating until Aug. 25 when its assets were expropriated by the Argentine Government. Compared with a profit of £1,690 for 1947, the Company showed a loss of £7,744 for 1948, due to increased cost of bulk supplies of gas from the Argentine State Gas Department and to higher wages. The remaining subsidiary, Buenos Aires Industrial Supply Company, continued to make small profits from income on investments, the profit for 1948 being £1,532 compared with £1,346 for 1947. None of the three subsidiaries has declared any dividend for 1948. At the last annual meeting the Chairman gave a full account of the Gas Company's claims in respect of the expropriation of its assets by the Argentine Government and other matters. The action in connection with the claim for compensation is still before the courts; the valuation of the Company's assets by three experts is proceeding, and it is expected that their work will be completed shortly. In the other important legal case brought against the Company by the Municipality, who claim some 26.6 mill. pesos for alleged excess profits, an extraordinary appeal by the Municipality to the Supreme Court against previous judgments in favour of the Company was granted. The Supreme Court revoked by a majority the previous judgments, and in consequence the suit was referred back to the Lower Court for a new verdict. The Company then entered a plea of nullity on the grounds that there should be a new hearing before passing sentence. This plea was rejected by the Lower Court judge and the case has now been taken to the Appeal Court, whose verdict is awaited. Three lawsuits brought against the Company by the Municipality, arising from differences of opinion on the method of calculating the gas tariff under the Company's former concession, have been decided in the Company's favour. A further legal action, initiated by some of the Company's former employees, for indemnities covering dismissal at the time when the business was taken over by the State, resulted in a verdict ordering the Company to pay the claimants a total of some 182,000 dollars. An appeal has been submitted to the Supreme Court.

Tunbridge Wells

Net revenue of the Tunbridge Wells Gas Company for the year ended Dec. 31, after providing for debenture interest and all other expenses, was £3,005, against £6,260 for the previous year. Dividend at 5% on the Maximum stock and 6½% on the

Sliding Scale stock left a balance to be carried forward of £16,983 compared with £17,605 brought in. The undertaking was vested in the South Eastern Gas Board on May 1.

Auckland Gas Company (New Zealand)

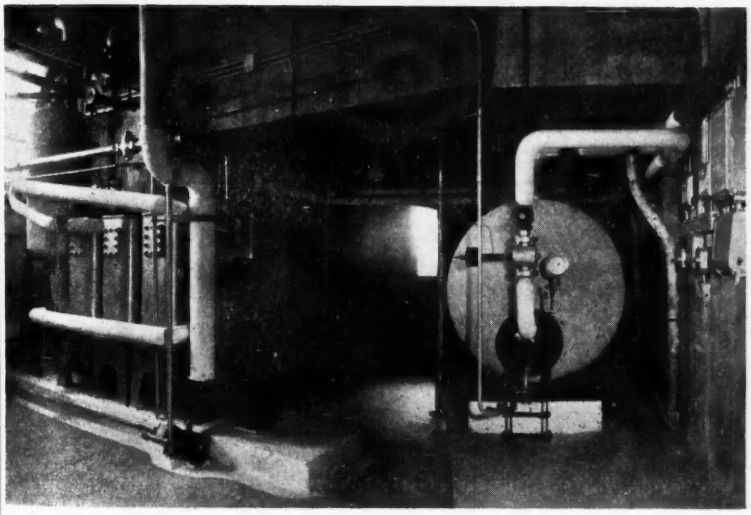
Profit for the year 1948, including Government subsidy of £22,500, after deducting working expenses, rates, and land tax, depreciation and other charges, amounted to £27,527, against £51,209 for the previous year. Payment of dividend at the rate of 2½% for the year leaves a balance of £12,178, against £13,878 brought in.

TRADE NEWS

From the London office of **Ames Crosta Mills & Co., Ltd.,** Abbey House, Victoria Street, S.W.1, we have received a leaflet dealing with the 'Pneu' pump, which is designed for pumping liquids containing solid matter, and viscous liquids. Of simple design and rigidly constructed, the pump has only one moving part, a ball valve, and it is claimed that maintenance is negligible. A small supply of compressed air is required to operate the pump, which is made in a variety of models and sizes with a maximum output of 60 gal./min. In addition to the standard models in steel, there are alternatives available in cast-iron, for certain corrosive liquors, in chemical stoneware, for highly corrosive liquids, and lead and rubber lined for various uses in the chemical industry.

George Royston & Son, Ltd., chemical engineers, Pogmoor Works, Barnsley, have published an attractive catalogue describing their 'Flash' dryer. The machine, which is used in the drying of sulphate of ammonia and other crystalline products, operates on the principle of removing moisture by cascading the crystals through unsaturated air. The principle of operation is described in detail with the aid of a flow diagram, and technical data are provided. Among the many advantages which are claimed for the plant are the absence of conveyors or elevators, elimination of intense heat, avoidance of any tendency to crush the product during handling, and facilities for quick cooling. Other features of the dryer are the remarkable short time taken by the product to travel through the complete cycle of operations—from two to four seconds, and the fully automatic nature of the process. The whole installation occupies a minimum of floor space and is designed to present a symmetrical and compact unit.

EMPIRE STADIUM DRESSING ROOMS



A general view of the boiler plant for the dressing-rooms at the Empire Stadium, Wembley, which were built for the Olympic Games and are now in regular use for various sporting events. Space heating is provided by latest type convectors. The boiler plant consists of two automatically controlled gas-fired steam boilers manufactured by Autocontrol Boilers, Ltd., inter-connected with plunge baths, hot water service storage and heating non-storage calorifiers. James Combe & Co., Ltd., heating and ventilating engineers, 14, Carlisle Road, The Hyde, London, N.W.9, were the installing engineers under the instructions of Sir Owen Williams & Partners, consulting engineers, Park Road, Baker Street, W.1.

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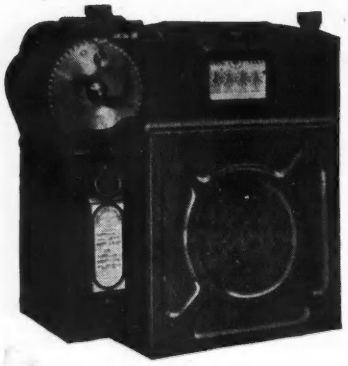

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